

## Prime Your Body for Fitness

By Lindsay Wilson

Whether you are an elite athlete, a gym rat, or a weekend warrior, you likely share a few common goals: strengthening your body, improving endurance, and increasing overall wellbeing. The human body was built for regular physical movement—it is crucial for optimal health—but regular physical activity can alter the body’s need for certain nutrients, specifically, those that support energy production, build, repair and maintain muscle, and fight inflammation. Taken in conjunction with a nutrient-dense diet, certain dietary supplements can help fine tune your body, allowing you to get the most out of your fitness routine.

Good nutrition, adequate hydration, and sufficient rest are fundamental for general health, but especially important to support and sustain the body during physical activity. In addition to these basic factors, consider these key supplements:

***B-vitamins.*** The B-vitamins play a varied and extensive role in the human body. They are necessary for cellular energy production, ensuring there is enough energy for physical activity; the synthesis of oxygen-carrying red blood cells; normal immune function; and for building and repairing damaged tissue. Athletes who have low B-vitamin statuses may not perform as well, especially at high intensities. In one metabolic feeding study, a group of male athletes were depleted of the B vitamins thiamin, riboflavin, and B6 over a three-week period by eating mainly processed foods. The athletes’ exercise performance decreased significantly at the end of the three weeks.<sup>i</sup> Other research suggests that exercise may increase the need for certain B vitamins, especially riboflavin and B6. A quality B-complex supplement will ensure that you consume balanced amounts of all of the B vitamins.

***Branched-chain amino acids (BCAAs).*** BCAAs are a group of amino acids—leucine, isoleucine, and valine—that are essential for muscle growth and repair. Isoleucine also helps shuttle glucose into the cells for energy. While most amino acids are metabolized by the liver, BCAAs are metabolized directly by muscle tissue. Exercise, especially endurance exercise, increases the breakdown of protein and amino acids, leading to a decline in levels of BCAAs, which can result in fatigue and muscle soreness.<sup>ii iii</sup> But supplementing with BCAAs before and after exercise has been shown to decrease muscle damage and promote muscle-protein synthesis. In one study, oral supplementation of BCAAs (77mg/kg of body weight) increased BCAA levels during exercise and led to less muscle breakdown. Similar results were found in another study in which subjects consumed 3.6 grams of amino acids with 37% BCAAs before and after exercise. The amino acid supplement decreased muscle soreness, presumably by stimulating muscle synthesis and suppressing protein breakdown and muscle damage.<sup>iv</sup>

***Whey protein.*** After any type of workout, the body needs protein for muscle building and repair. Whey protein is one of the best sources of BCAAs, particularly leucine, and is quickly absorbed and utilized by the muscles, giving them the food they need to stop muscle breakdown and shift to growth and repair.<sup>v vi vii</sup> Whey protein also contains cysteine, an important building block of the body’s master antioxidant glutathione, and has been found to increase glutathione levels.<sup>viii ix</sup>

**Beet root juice.** A recent study published in the *American Journal of Physiology—Regulatory, Integrative and Comparative Physiology*, found that regular consumption of 70 mL (about 1/3 cup) of beet root juice was associated with increases in blood levels of nitrates and nitrites, decreases in blood pressure, and delayed onset of fatigue in healthy men. The researchers said that the findings suggest that beet root juice can enhance physical performance by “enhancing oxygen delivery and reducing work of the heart, allowing exercise to be performed ... for a longer period of time before the onset of fatigue.”<sup>x</sup> Compounds in beets interact with stomach enzymes to produce nitrous oxide—nitrous oxide is converted into nitric oxide, which is responsible for vasodilation. Vasodilation helps improve the flexibility of blood vessels, which is suggested to help allow more blood flow to active muscle and support aerobic metabolism.<sup>xi</sup>

**Fish oil.** The omega-3 fats found in fish oil support recovery by modulating post-exercise inflammation and reducing oxidative stress.<sup>xii</sup> One study found that 3 grams of fish oil taken daily for one week minimized delayed onset muscle soreness after strenuous strength-training exercise in healthy men and women; participants were also able to perform more repetitions after supplementation, possibly due to increased muscle strength or decreased fatigue.<sup>xiii</sup> Other research has shown that fish oil reduces heart rate and oxygen consumption during exercise (without a decrease in performance),<sup>xiv</sup> reduces cortisol levels and increases lean body mass,<sup>xv</sup> and increases muscle protein synthesis in healthy individuals.<sup>xvi</sup> Doses in studies range from 3 grams to 8 grams daily.

## SIDEBAR

### ***Fueling Up for Your Workout***

By Trevor Bennion, MS

Although the body can use both carbohydrates and fats effectively as fuel, your pre-workout nutrition plan should emphasize nutrient-dense carbohydrates. The truth is that we all have plenty of stored body fat to provide the metabolic fuel we need during physical activity, but we do not have an abundance of stored carbs. The main purpose of fats in a pre-workout meal is to add variety, flavor, and satiety, not to necessarily satisfy any physiological need. Carbohydrates, on the other hand, are the main macronutrient that should be emphasized before, during, and after exercise; they are the fuel that propels energy production and fat metabolism, they keep our adrenal hormones balanced (too few carbohydrates in the diet in addition to heavy physical activity can result in chronic cortisol secretion, the first step toward developing overtraining syndrome, as well as other symptoms of chronic stress), and they spare the muscles from breaking down to free amino acids as a backup source of fuel. Just be sure to choose nutrient-dense carbohydrates such as fruits and vegetables.

Protein should be consumed about every two to three hours to support physical activity. While it doesn't act as a primary fuel source for exercise, it is extremely important for repair and structural support of abused muscle tissue.

Timing is also key: Solid food should be eaten about 1.5-2 hours before physical activity; as the workout draws closer, shift to liquid foods. Don't eat too much, as you will send your body conflicting signals (fight or flight vs. rest and digest). Typically, a pre-workout meal would avoid fat, or be low in

fat, so that carb absorption and digestion is minimally affected. Medium chain triglycerides (MCTs), such as those found in coconut oil, are the exception—the rate at which MCTs are absorbed and metabolized match carbohydrates, making MCTs an effective food fuel before and during exercise.

If you’re not metabolically primed to work out, then your body will hit a wall and stop you in your tracks no matter how motivated you are. With a little nutrient know-how and timing, you can always ensure that your body is fueled up to give its all.

## References

- <sup>i</sup> Woolf, K., & Manore, M. M. (2006). B-vitamins and exercise: Does exercise alter requirements? *International Journal of Sport Nutrition and Exercise Metabolism*, 16, 453 - 484.
- <sup>ii</sup> <http://examine.com/supplements/branched-chain-amino-acids/>
- <sup>iii</sup> Campbell B, Kreider R, et al. “International Society of Sports Nutrition position stand: protein and exercise.” *Journal of the International Society of Sports Nutrition*. 2007;4(8). <http://www.jissn.com/content/4/1/8>
- <sup>iv</sup> Shimomura Y, Murakami T, et. al. “Exercise Promotes BCAA Catabolism: Effects of BCAA Supplementation on Skeletal Muscle During Exercise.” *Journal of Nutrition*, July 2004.
- <sup>v</sup> Kerkick C, Harvey T, et. al. “International Society of Sports Nutrition position stand: nutrient timing.” *J Int Soc Sports Nutr*. 2008 Oct 3;5(17). <http://www.ncbi.nlm.nih.gov/pubmed/18834505>
- <sup>vi</sup> Churchward-Venne T, Burd N, Phillips S. “Nutritional regulation of muscle protein synthesis with resistance exercise: strategies to enhance anabolism.” *Nutrition & Metabolism*. 2012;9(40).
- <sup>vii</sup> Tipton KD, Elliot TA, et al. “Ingestion of casein and whey proteins result in muscle anabolism after resistance exercise.” *Med Sci Sports Exerc*. 2004 Dec;36(12):2073-81.
- <sup>viii</sup> Chitapanarux T, Tienboon P, et al. “Open-labeled Pilot Study of Cysteine-rich Whey Protein Isolate Supplementation for Nonalcoholic Steatohepatitis Patients.” *J Gastroenterol Hepatol*. 2009;24(6): 1045-1050.
- <sup>ix</sup> Kent KD, Harper WJ, Bomser JA. “Effect of whey protein isolate on intracellular glutathione and oxidant-induced cell death in human prostate epithelial cells.” *Toxicology In Vitro*, 2003. <http://essentialnutrition.eu/media/wysiwyg/pdf/cacao/3.pdf>
- <sup>x</sup> Lee J, Stebbins C, et. al. “Effects of Chronic Dietary Nitrate Supplementation on the Hemodynamic Response to Dynamic Exercise.” *Am J Physiol Regul Comp Physiol*, June 2015. <http://ajpregu.physiology.org/content/early/2015/06/15/ajpregu.00099.2015>
- <sup>xi</sup> Bennion, T. “Fueling for Fitness: Basics of Sports Nutrition.” Natural Grocers Nutrition Education Training. Aug, 2015.
- <sup>xii</sup> Gray, P., Chappell, A., Jenkinson, A. M., Thies, F., & Gray, S. R. (2014). Fish oil supplementation reduces markers of oxidative stress but not muscle soreness after eccentric exercise. *Sport Nutrition and Exercise Metabolism*, 2014;(24):206-214.
- <sup>xiii</sup> Jouris KB, McDaniel JL, Weiss EP. “The Effect of Omega-3 Acid Supplementation on the Inflammatory Response to Eccentric Strength Exercise.” *J Sports Sci Med*. 2011 Sep; 10(3):432-8. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3737804/>
- <sup>xiv</sup> Peoples G, McLennan P, Howe P, Groeller H. “Fish Oil Reduces Heart Rate and Oxygen Consumption During Exercise.” *Journal of Cardiovascular Pharmacology*. Dec 2008;52(6):540-7. [http://www.researchgate.net/publication/23497866\\_Fish\\_Oil\\_Reduces\\_Heart\\_Rate\\_and\\_Oxygen\\_Consumption\\_During\\_Exercise](http://www.researchgate.net/publication/23497866_Fish_Oil_Reduces_Heart_Rate_and_Oxygen_Consumption_During_Exercise)
- <sup>xv</sup> Noreen E, Sass M, et al. “Effects of supplemental fish oil on resting metabolic rate, body composition, and salivary cortisol in healthy adults.” *Journal of the International Society of Sports Nutrition*, 2010. 7(31): 1 - 7. <http://www.jissn.com/content/7/1/31>
- <sup>xvi</sup> Smith G, Atherton P, et al. “Omega-3 polyunsaturated fatty acids augment the muscle protein anabolic response to hyperaminoacidemia-hyperinsulinemia in healthy young and middle aged men and women.” *Clin Sci*. 2011 Sep;121(6):267-278. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3499967/>